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of our pleasure in the excursion so admirably planned and so happily executed.

As the Botanical Club of the Association has never before been so well attended, so also has it never before been so hospitably cared for and so happily entertained as at Buffalo. What more can they do for it in 1896?

Essay toward a revision of *Dodecatheon*.*

ASA GRAY.

Probably every botanist who has turned his attention to this genus has suspected it to be of more than one species. But those who have attempted to deal with the numerous now extant forms have been baffled in their endeavors to distinguish and define them. In the Synoptical Flora of North America I could do no better than to arrange the forms loosely under seven varieties. If I have now done better in the attempted discrimination of five species the credit is largely due to indications and specimens supplied to me by two western correspondents, Mr. Suksdorf, of Washington Territory, and Prof. L. F. Henderson, of Oregon, to the latter especially in pointing out to me the anomalous character of the form which I have accordingly designated by his name.

If the assigned characters hold out it will be in good part by their fruits that we shall know them; and fruit is rare in our specimens, so that many of them can only be guessed at, and the value of the present scheme is still to be tested. But present indications point to five species, the principal characters of which are exhibited in the subjoined

CLAVIS DODECATHEORUM.

A. Short filaments manifest, being inserted at the very orifice of the short corolla-tube, and distinctly monadelphous: leaves with tapering base.

1. Capsule acute, coriaceous, opening at apex by valves:

Eastern.

D. MEADIA.

2. Capsule obtuse, coriaceous, opening at or from the apex by valves: Western.

Leaves from narrowly or elongated to obovate-spatulate: capsule oblong to cylindraceous, usually much surpassing the calyx.

D. JEFFREYI.

Leaves obovate or oval with cuneate base, short: capsule globular, hardly surpassing the calyx.

D. ELLIPTICUM.

* Read before the Botanical Club of the A. A. S., Buffalo meeting, 1886.

3. Capsule obtuse, thin, cylindraceous, or suburceolate, surpassing the calyx, truncately dehiscent by circum-scission of the apex: leaves obovate.

D. HENDERSONI.

B. Anthers seemingly sessile, the very short and distinct filaments being inserted below the orifice of the corolla and included in its throat¹: leaves ovate or obovate, often abruptly contracted into the margined petiole. D. FRIGIDUM.

1. D. MEADIA L., the original species, and the only one of the Atlantic region, has an acute capsule, of coriaceous-crustaceous texture; the narrow and obtusely acute apex, of slightly different color from the rest, but of same texture, opens into five dentiform valves, which hardly ever dehisce further down. There are plentiful Rocky Mountain specimens (such as are represented by the *D. integrifolium* Hook. Bot. Mag. t. 3622, from the north, and by Fendler's no. 549 from New Mexico) which probably go with this; but fruit is wanting.

2. D. JEFFREYI Moore, in Van Houtte, Fl. des Serres, xvi. (1867) 99, t. 1662. The figure represents a large and robust form of a common Pacific coast Dodecatheon, the firm and erect leaves of which are said to be at least a foot long, and the scapes and peduncles are correspondingly grandiose. But it is added that in dry soil the plants are small and weak. It is said to have come from the Rocky Mountains, but it represents a form which we have only from the Pacific coast, where it is probable that Jeffrey gathered the seed. It is just the *D. integrifolium* of Bongard, and var. *vegetius* of Ledebour Fl. Ross. from Sitka, etc., the *D. Meadia*, var. *macrocarpum* of the Synop. Flora, also the var. *lanceifolium* of the same, a form with usually shorter capsules. As var. ALPINUM we may for the present include the *D. Meadia* var. *alpinum* of the Synoptical Flora; but fruit of those small and narrow-leaved mountain forms is still little known. As far as seen it is fusiform, cylindrical and narrow, but whether blunt or pointed is not so clear. With little doubt the *D. Meadia*, var. *frigidum* Hook. f. Bot. Mag. t. 5871 belongs to *D. Jeffreyi*. The stamens as well as the leaves are not those of *D. frigidum*. As at present received the species ranges from Sitka to the Guadalupe Islands off Lower California.

3. D. ELLIPTICUM Nutt. ex Durand in Jour. Acad. Philad., ser. 2, iii. 94. *D. Meadia*, var. *brevifolium* Gray, Syn. Fl. ii. 57. *D. integrifolium* Benth. Fl. Hartw. t. 322. This is rather common in California, from San Diego county, and San Bernardino, ap-

¹ I can not agree to the statement of the late Mr. Durand (in Jour. Acad. Philad. ser. 2, iii. 95)—excellent observer though he was—that the filaments are unconnected in *D. Meadia* and its near allies: they are certainly monadelphous into a ring or short tube in the flower-bud and in anthesis in all the species except *D. frigidum*, separating only as the gravid ovary enlarges.

parently not on the mountains, and northward to the Columbia river. From the latter I have unusually large specimens, coll. by Suksdorf, in springy places on rocks, Columbia river, with flowers collected in April and fruit in May. I presume this to be Nuttall's species, taken up by Durand, who well describes it though without the fruit, which I have well formed only from Suksdorf. If I mistake not it extends to St. Lawrence Bay on the Asiatic Coast; for to this (though without fruit) I incline to refer some specimens there collected by Eschscholtz (unless there has been confusion of localities) and which have entered into Chamisso and Schlechtendal's description of *D. frigidum*. For the two taller out of four small plants from the herbarium of the St. Petersburg garden, ticketed by Herder, have the well-exserted stamen-tube of the present group. If not *D. ellipticum* they must belong to a depauperate *D. Jeffreyi*, which extends well northward. *D. ellipticum* should be distinguished by its globular or short-ovoid capsule, barely equaling or slightly surpassing the calyx (if this character holds out); also by the shorter and blunter anthers.

4. *D. HENDERSONI*. Prof. Henderson, in sending me excellent specimens of this peculiar species (collected in Tualatin plains, Oregon), called my attention to its character. The broad and short leaves are like those of *D. ellipticum*, and the flowers are similar. But the capsule is chartaceous in texture, when well grown nearly twice the length of the calyx, cylindraceous-oblong, becoming urceolate as the placenta enlarges and the open summit broadens: the short more or less hemispherical apex becomes more distinctly circumscribed than in other species and at length falls away (along with the style) *as a lid*, and the truncate orifice seems indisposed to split up at all into valves. Upon searching among my specimens which had been referred to *D. Meadia*, var. *brevisfolium*, I detect this species from Clear Water, Idaho, in the old collection of the late Mr. Spalding; from W. Klikitat county, Washington Terr., April, 1883, coll. Suksdorf, on mountain sides; also, but less marked, from the south side of Tamalpais, California, at the elevation of 2000 feet, coll. Brewer (1862), who notices it as quite unlike the form in the valleys below. This is the only species which in this revision demands a new name; and it may properly bear that of the acute observer who indicated its peculiarity.

5. *D. FRIGIDUM* Cham. & Schlecht. in Linn. i. 222, at least partly; Hook. Fl. i. 119; Seem. Bot. Herald, 38. t. 9. *D. Meadia*, var. *frigidum* Gray, Syn. Fl. l. c. The very short filaments in this species I find to be distinct down to the insertion in the

throat of the corolla, manifestly below the orifice: in anthesis they do not show at all; later they may slightly project. According to Seemann's figure the "not quite ripe" capsule is ovoid and slightly longer than the calyx. This figure accords well with the specimens from coll. Wright, of Arakamtchetchene Island, Behring Strait; from Arctic Alaska, Muir; and Lake Lindeman at the head of the Yukon, Lieut. Schwatka. Originals from Chamisso, and part of those from St. Lawrence Bay, Eschscholtz, are similar but smaller.

Var. DENTATUM. Larger: leaves with blade from one or two to three or nearly four inches long (in the dried specimens thin), oval or ovate to oblong, commonly repand or sparingly dentate, at base abruptly or truncately contracted into long and wing-margined petioles: scapes a span to a foot high, 2-7-flowered: corolla so far as known white: capsule globular- to oblong-ovoid, moderately surpassing the ovate or triangular-acuminate calyxlobes, half-5-valved.—*D. dentatum* Hook. Fl. i. 119. *D. Meadia*, var. *frigidum* Watson, Bot. King Exp. partly. *D. Meadia*, var. *latilobum* Gray, Syn. Fl. l. c. The "N. W. Interior, Douglas" is probably interior of Oregon. Lyall collected it in 1850 on the east sides of the Cascade Mountains in Washington Terr.; Brandegee in the same region in open woods in 1883; Suksdorf in 1885, at the foot of a waterfall near Bridal Veil in N. E. Oregon; Henderson in 1884 and 1885 on wet rocks, along bluffs of the Willamette; Howell near the Cascades in 1886. The most southern and remote station is that of Watson in the Wahsatch Mountains, Utah, at the head of Cottonwood Cañon. It has all the essential characters of *D. frigidum*, but is much larger.

The Development of the Gymnosporangia of the United States.*

W. G. FARLOW.

The study of the connection between the different forms of Gymnosporangium and Roestelia known in the United States has not been by any means as simple as the similar study in Europe. This is owing, perhaps, to the fact that we have about double the number of species found in Europe, and it has not always been easy to determine exactly which of our forms were the same as those of Europe, or even clearly to define our own species. Before one could begin to study the connection between the Gymnosporangia and Roesteliæ, it was necessary to have a compara-

*Read before the A. A. A. S., Buffalo meeting, 1886.